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10/760,524	01/21/2004	Wei-Hong Wang	2019-0236P	1104
2292 7590 03/19/2008 BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747				
EXAMINER				
LIN, JAMES				
ART UNIT		PAPER NUMBER		
1792				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary**Application No.**

10/760,524

Applicant(s)

WANG, WEI-HONG

Examiner

Jimmy Lin

Art Unit

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 January 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13, 15-17 and 26-33 is/are pending in the application.
- 4a) Of the above claim(s) 2, 4-7, 10-13 and 15-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3, 8, 9 and 26-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. The amendments are non-compliant because claim 33 has been amended such that a "," (i.e., a comma) has been deleted with a strike-through. The strike-through does not actually go through the "," and cannot be easily perceived as being deleted. The deletion should have been done with double brackets (e.g., [[,]]). See MPEP 714.I.C(B).

Claim Objections

2. Claim 1 is objected to because of the following informalities:

Applicant seemed to have meant "hydrolysis" when reciting "hydrosis" (see, e.g., pg. 1, lines 11-14). Thus, the term "hydrosis" should be changed to "hydrolysis".

Additionally, the recitation of "hydrosis in aqueous solution to form TiO₂-SCA gel" is inconsistent with the rest of the phrase because neither hydrosis nor hydrolysis is a verb and the recitation does not start with a verb.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 33 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claim recites "combining said titanium alkoxide Ti(OR)₄ with chelating agents: Eu or rare earth metal salt, and an aqueous solution to form a TiO₂SCA gel". This recitation is indefinite because it is unclear as to the use of the ":" (i.e., the colon). The claim is indefinite as to whether the "Eu or rare earth metal salt" is defining the "chelating agents" of it the "Eu or rare earth metal salt" is a separate element that is combined to form a TiO₂ SCA gel. For the purpose of this examination, the recitation will be interpreted to be at least inclusive of both.

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

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The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claim 33 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification does not exemplify Eu or a rare earth metal salt as a chelating agent (see pg. 8, lines 19-22). Thus, the claim contains new matter.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1, 3, 8-9, 30-31, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakatsu (U.S. Patent No. 6,242,862) in view of Nakabayashi (EP 1,136,125) and Willner et al. (U.S. Patent No. 6,365,007). Toki et al. (U.S. Publication No. 2004/0197254) and Fujimoto et al. (U.S. Publication No. 2003/0013930) are cited as evidence of inherency.

Kawakatsu discloses a method of fabricating a photocatalytic fluorescent lamp (Fig. 12) comprising:

combining titanium alkoxide with acetylacetone (i.e., a strong chelating agent (SCA), see [0030] of Toki as evidence of inherency) in aqueous solution (col. 15, lines 7-15) to form TiO₂-SCA gel;

forming semiconductor nano-anatase TiO₂ sol (column 9, lines 35-37);

dip coating the nano-crystalline anatase sol (column 15, lines 15-16) on a surface of a fluorescent lamp tube (Fig. 12);

baking said fluorescent lamp tube coated with nano-crystalline anatase sol to form a photocatalytic coating fluorescent lamp (column 4, line 23) capable of cleaning air (column 1, lines 17-18);

wherein the baking step is carried out at a temperature above 200 °C (column 4, line 23).

Kawakatsu does not explicitly teach that hydrolysis occurs in the aqueous solution. However, the specification seems to suggest that hydrolysis occurs in the presence of the aqueous solution (see, e.g., pg. 8, lines 26-27). Because Kawakatsu teaches that the titanium dioxide can be combined in an aqueous solution, as discussed above, at least some degree of hydrolysis must necessarily occur.

The claims require a baking step at a temperature of *about* 100-200 °C. The temperature range is interpreted to be from about 100 °C to about 200 °C. In this case, about 200 °C includes temperatures close to but not exactly 200 °C, such as temperatures slightly higher. Thus, about 200 °C would at least have an overlapping range with above 200 °C. Additionally, assuming *arguendo* that the claim requires an upper limit of exactly 200 °C, one of ordinary skill in the art would have expected that the temperatures of 200 °C and 200.1 °C (i.e., above 200 °C) are so close that either temperature would have yielded similar results and would have resulted in a photocatalytic lamp having similar properties when using either temperature. A *prima facie* case of obviousness exists where the claimed ranges and prior art do not overlap but are close enough that one of ordinary skill in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 f.2d 775, 227 USPQ 773 (Fed. Cir. 1985). See MPEP 2144.05. It would have been obvious to one of ordinary skill in the art at the time of invention to have used 200 °C, as opposed to a temperature slightly above 200 °C, with a reasonable expectation of success and an expectation of similar results. Moreover, the upper limit of 200 °C is not explicitly taught in the specification and, thus, has no criticality in the process. Such a change of the upper limit seems to be an attempt to overcome the applied prior art but would not be a patentable difference because the Applicant has not shown that such a temperature would have unexpected results. Because the claim has been amended from an upper limit of 250 °C to 200 °C without any support of criticality, the Applicant has shown that an upper limit of 200 °C would have been an obvious modification.

Kawakatsu does not explicitly teach that a Eu or rare earth metal salt is combined with the chelating agent and aqueous solution. Kawakatsu does teach a method of making a photocatalytic film comprising of a titanium dioxide sol.

Willner teaches that the incorporation of lanthanide ions such as europium ions in a titanium dioxide matrix, e.g., by means of a sol-gel method enhances the photocatalytic activity of the titanium dioxide (col. 2, lines 1-47). The europium can be incorporated into the sol-gel with the addition of europium acetate (i.e., a europium salt, see [0018] of Fujimoto as evidence) (col. 5, lines 8-17) in order to form a europium doped titanium oxide (col. 6, lines 1-3). Because Willner teaches advantages for doping titanium dioxide being used as a photocatalyst, it would have been obvious to one of ordinary skill in the art at the time of invention to have doped the titanium oxide of Kawakatsu with europium by the addition of europium acetate into the sol-gel with a reasonable expectation of success. One would have been motivated to do so in order to have enhanced the photocatalytic activity.

Kawakatsu does not explicitly teach the step of peptizing the TiO_2 gel by adjusting the pH and forming crystalline TiO_2 particles via a hydrothermal process. However, Nakabayashi teaches a method of making a photocatalyst comprising of titanium oxide sol. The method of making the titanium oxide sol includes a peptizing process with ammonia and a hydrothermal treatment thereafter [0039]. The selection of something based on its known suitability for its intended use has been held to support a prima facie case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have included a peptizing process and a hydrothermal treatment in the method of making the titanium oxide sol of Kawakatsu with a reasonable expectation of success because Nakabayashi teaches that such processes are suitable in the method of making titanium oxide sol.

Considering that the materials used in forming the nano-crystalline anatase sol and the baking temperature are substantially the same as those disclosed and claimed by applicant, the brightness of the photocatalytic coating fluorescent lamp would inherently increase, unless some critical steps are missing from the claims. In addition, a small amount of UVA and blue light from the fluorescent lamp would inherently be absorbed by the anatase coating.

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Claims 3,31: Nakabayashi teaches that the peptizing process can be carried out using ammonia [0039].

Claim 8: Kawakatsu teaches that a normal fluorescent lamp can be used (Fig. 12).

Claim 9: The fluorescent lamp is a straight tube (Fig. 12).

Claim 30: Kawakatsu teaches a TiO_2 -SCA gel having the formula $\text{H}_y\text{TiO}_{[(4-y)/2+y]}$, wherein y equals 0.

9. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakatsu '862 in view of Nakabayashi '125 and Willner '007 as applied to claim 1 above, and further in view of Rengakuji et al. (U.S. Patent No. 6,602,607).

Kawakatsu, Nakabayashi, and Willner are discussed above, but do not explicitly teach a titanium alkoxide, wherein the R of $\text{Ti}(\text{OR})_4$ is a hydrocarbon group, $\text{C}_n\text{H}_{2n+1}$, where $n=1-5$. However, Rengakuji teaches that such titanium alkoxides are well known for their use to make titanium dioxide as a photocatalyst (abstract; col. 3, lines 31-35). The selection of something based on its known suitability for its intended use has been held to support a prima facie case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used one of the titanium alkoxides as taught by Rengakuji as the particular titanium alkoxide of Kawakatsu with a reasonable expectation of success because Rengakuji teaches that such alkoxides are suitable for use as a photocatalyst.

10. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakatsu '862 in view of Nakabayashi '125 and Willner '007 as applied to claim 1 above, and further in view of Mori et al. (U.S. Patent No. 6,420,437).

Kawakatsu, Nakabayashi, and Willner are discussed above, but do not explicitly teach that the chelating agents can be acetonacetate, amino acid, succinic acid, or an organic alcohol $[\text{RC}_6\text{H}_3(\text{OCH}_2\text{OH})]$. However, Mori teaches the use of succinic acid as a chelating agent in the method of making titanium oxide sol. The selection of something based on its known suitability for its intended use has been held to support a prima facie case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would

have been obvious to one of ordinary skill in the art at the time of invention to have used succinic acid as the particular chelating agent of Kawakatsu with a reasonable expectation of success because Mori teaches that such a chelating agent is suitable in the art of making titanium oxide sol.

11. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakatsu '862 in view of Nakabayashi '125 and Willner '007 as applied to claim 1 above, and further in view of Boykin et al. (U.S. Publication No. 2004/0112411).

Kawakatsu, Nakabayashi, and Willner are discussed above, but do not explicitly teach that the chelating agents can be acetoneacetate, amino acid, succinic acid, or an organic alcohol [$\text{RC}_6\text{H}_3(\text{OCH}_2\text{OH})$]. However, Boykin teaches that amino acids are well-known chelating agents. The selection of something based on its known suitability for its intended use has been held to support a prima facie case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used succinic acid as the particular chelating agent of Kawakatsu with a reasonable expectation of success because Mori teaches that amino acids are suitable chelating agents.

12. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakatsu '862 in view of Nakabayashi '125 and Willner '007 as applied to claim 1 above, and further in view of Baiker et al. (U.S. Patent No. 5,935,895).

Kawakatsu, Nakabayashi, and Willner are discussed above, but do not explicitly teach that the molar ratio of the chelating agent and the titanium alkoxide has a molar ratio of 0.01-1.0. However, Baiker teaches that titanium alkoxide and the chelating agent can have a molar ratio between about 1:2 and about 3:1. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used a ratio between 1:2 and 3:1 of the titanium alkoxide to the chelating agent with a reasonable expectation of success because Baiker teaches that such molar ratios are suitable for such a mixture. In addition, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical (MPEP

2144.05.II.A.). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have looked to the prior art for a conventional or known molar ratio for the mixture of chelating agent and titanium alkoxide.

13. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakatsu '862 in view of Nakabayashi '125 and Willner '007 as applied to claim 1 above, and further in view of Tabatabaie-Raissi et al. (U.S. Patent No. 6,309,611).

Kawakatsu, Nakabayashi, and Willner are discussed above, but do not explicitly teach that the titanium alkoxide is combined with chelating agents and a water-based aqueous solution. However, Tabatabaie-Raissi teaches the combination of titanium alkoxide, ethanol, and acetylacetone (i.e., a chelating agent) with water in the method of making a photocatalytic device (col. 9, lines 57-65). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have added water to the titanium alkoxide/acetylacetone solution of Kawakatsu with a reasonable expectation of success because Tabatabaie-Raissi teaches that such an aqueous solution is suitable in making a photocatalytic device.

14. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakatsu '862 in view of Nakabayashi '125 and Willner '007 as applied to claim 1 above, and further in view of Nakamura et al. (U.S. Patent No. 5,759,251).

Kawakatsu, Nakabayashi, and Willner are discussed above, but do not explicitly teach that H_4TiO_4 solution to a H_4TiO_4/TiO_2 ratio of about 0-10 wt%. However, Nakamura teaches a method of making a photocatalytic and transparent TiO_2 coating (abstract), wherein the coating can be prepared by adding an orthotitanic acid (i.e., H_4TiO_4) solution to a titanium dioxide solution (col. 13, lines 1-21). The orthotitanic acid can have a ratio between 0-0.5 wt% (Table 1). Because Nakamura teaches that such is operable in the art of photocatalytic titanium dioxide, it would have been obvious to one of ordinary skill in the art at the time of invention to have added orthotitanic acid solution to the TiO_2 solution of Nakabayashi at a H_4TiO_4/TiO_2 ratio of about 0-0.5 wt% with a reasonable expectation of success. The selection of something based on its known suitability for its intended use has been held to support a prima facie case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Response to Arguments

15. Applicant's arguments filed 6/13/2007 have been fully considered but they are not persuasive.

Claims 1, 3, 8-9, 30-31, and 33 as rejected over Kawakatsu '862, Nakabayashi '125, and Willner '007:

Applicant argues on pg. 18 that the prior art does not disclose or suggest combining with chelating agents, doping with Eu or rare earth metal salt, and hydrolysis in aqueous solution to form TiO₂-SCA gel as recited in the present claims. However, the specification seems to suggest that hydrolysis occurs in the presence of the aqueous solution (see, e.g., pg. 8, lines 26-27). Because Kawakatsu teaches that the titanium dioxide can be combined in an aqueous solution, as discussed above, at least some degree of hydrolysis must necessarily occur. As to the doping with Eu or rare earth metal salt, Willner teaches the advantages of doping titanium dioxide with a europium salt. Thus, the prior art of record teaches all the limitations of the claims as recited.

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Wiederhoft et al. (5,840,111) discloses a process for making nanodisperse titanium dioxide.

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jimmy Lin whose telephone number is (571)272-8902. The examiner can normally be reached on Monday thru Friday 8AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jimmy Lin/
Examiner, Art Unit 1792

/Timothy H Meeks/
Supervisory Patent Examiner, Art Unit 1792